AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): ~~Method~~ A method for enhancing the quality of a received acoustic signal~~, in particular speech signal~~, wherein the ~~received~~ acoustic signal has been generated by a single microphone, wherein the ~~received~~ acoustic signal is subjected to an analysis of characteristics, the method comprising ~~wherein the analysis is used to estimate~~ :

estimating ~~one or more~~ a plurality of virtual microphone signals using the analysis, ~~which are parts of~~ from the ~~received~~ acoustic signal~~, and the one or more virtual microphone signals are used to generate an enhanced quality acoustic signal, in particular with reduced echo and/or reduced reverberation compared to the received acoustic signal~~

wherein the plurality of virtual microphone signals are free of reverberation, and the first virtual microphone signal corresponds to a direct sound without any time delay, and

wherein an n-th virtual microphone signal is obtained using a time delay dn that is a time period between an onset of an (n-1)-th reverberation sound of the acoustic signal and an onset of an n-th reverberation sound of the acoustic signal, the n being an integer equal to or greater than 2;

delaying each of the plurality of virtual microphone signals by a different respective period of time; and

adding the delayed each of the plurality of virtual microphone signals to produce an output signal.

2. (currently amended): ~~Method~~ The method according to claim 1, wherein:

a) the ~~received~~ acoustic signal is subjected to an analysis detecting ~~the~~ a time period d1 between the direct sound and ~~the~~ an onset of a first reverberation sound ~~within~~ of the ~~received~~ acoustic signal,

b) a delay signal is generated by delaying the ~~received~~ acoustic signal by the time period d1,

c) a modified ~~delay~~ delayed signal is created by modifying the ~~delay~~ delayed acoustic signal applying a set of modification parameters,

d) ~~a~~ the first virtual microphone signal is generated by subtracting the modified ~~delay~~ delayed signal from the ~~received~~ acoustic signal,

e) the first virtual microphone signal is subjected to an analysis generating one or several analysis parameters, and

f) the modification parameters are adapted within a feedback loop~~, optimizing~~ to optimize the ~~analysis parameter~~ first virtual microphone signal~~, in particular~~ by minimizing ~~the~~ an overall amplitude of the first virtual microphone signal.

3. (currently amended): ~~Method~~ The method according to claim 2, wherein the ~~enhanced quality acoustic~~ output signal is generated by amplifying ~~the~~ a level of the first virtual microphone signal~~, in particular~~ to a normal loudness.

4. (currently amended): The method ~~Method~~ according to claim 2, further comprising ~~for generating an nth virtual microphone signal, with n ∈ IN, n ≥ 2, wherein~~ generating an ~~nth~~ n-th intermediate signal ~~is generated~~ by subtracting the first to (n-1)-th virtual microphone ~~signal~~ signals from the ~~received~~ acoustic signal,

a') the ~~nth~~ n-th intermediate signal is subjected to an analysis detecting the time period dn ~~between the onset of sound and the onset of reverberation sound within the nth intermediate signal~~\,

b') an ~~nth~~ n-th ~~delay~~ delayed signal is generated by delaying the ~~nth~~ n-th intermediate signal by the time period dn,

c') an ~~nth~~ n-th modified delay signal is generated by modifying the ~~nth~~ n-th ~~delay~~ delayed signal applying a set of modification parameters,

d') ~~an nth~~ the n-th virtual microphone signal is generated by subtracting the ~~nth~~ n-th modified ~~delay~~ delayed signal from the ~~nth~~ n-th intermediate signal,

e') the ~~nth~~ n-th virtual microphone signal is subjected to an analysis generating one or several analysis parameters, and

f') the modification parameters are adapted within a feedback loop~~, optimizing~~ to optimize the ~~analysis parameter~~ n-th virtual microphone signal~~, in particular~~ by minimizing ~~the~~ an overall amplitude of the ~~nth~~ n-th virtual microphone signal.

5. (currently amended): ~~Method~~ The method according to claim 4, wherein the ~~enhanced quality acoustic~~ output signal is generated by adding a number of N virtual microphone signals, with ~~N $\in$ IN, N $\geq$ 2~~ being an integer equal to or greater than 2, wherein the ~~mth~~ n-th virtual microphone signal is delayed by a time period $tm = \sum_{i=m}^{N-1} di$, with $m \in [1,\ldots, N-1]$, and the ~~Nth~~ N-th virtual microphone signal is undelayed.

6. (currently amended): ~~Method~~ The method according to claim 4, wherein the modification in steps c) and/or c') is performed by a finite impulse response unit, and wherein the modified time period of the finite impulse response unit is at least ~~as long as the~~ a reverberation time of the ~~received~~ acoustic signal.

7. (currently amended): ~~Method~~ The method according to claim 4, wherein ~~the~~ determination of the analysis parameters in steps e), and/or e') is performed by a least mean square method and/or a normalized least mean square method.

8. (currently amended): ~~Method~~ The method according to claim 4, wherein the ~~received~~ acoustic signal and/or the ~~nth~~ n-th intermediate signal and/or the delayed signal and/or the ~~nth~~ n-th delayed signal is/are subjected to a Fourier transformation, and the modification is performed in ~~the~~ a frequency domain.

9. (currently amended): ~~Method~~ The method according to claim 4, wherein in steps a) and/or a') ~~the~~ an onset of ~~the~~ a reverberating sound in ~~the~~ a signal amplitude ~~vs.~~ in view of a time diagram of the ~~received~~ acoustic signal and/or ~~nth~~ the n-th intermediate signal is determined by

observing an edge of the signal amplitude following a time period of a substantially constant signal amplitude within a limited frequency interval~~, in particular within~~ of 100-300 Hz.

10. (withdrawn): Method according to claim 1, wherein a start of the received acoustic signal is detected, and that the following steps are performed recursively in one or more cycles:

a) observing the stored signal, i.e. in the first cycle the received acoustic signal, else the processed signal derived in the preceding step c) to be further cleaned, for a signal excitation indicating the start of a disturbing echo and/or reverberation signal;

b) determining the time delay d between the start of the received acoustic signal and the start of the disturbing echo and/or reverberation signal, and estimating the magnitude of the disturbing echo and/or reverberation signal;

c) generating a processed signal by subtracting a compensation signal from the stored signal, wherein the compensation signal is derived from the stored signal by shifting the stored signal by the time delay d and scaling the stored signal with the estimated magnitude, wherein the processed signal of the last cycle is defined to be the first virtual microphone signal.

11. (currently amended): An acoustic signal quality enhancement device, ~~comprising means for performing a method according to claim 1~~, wherein an acoustic signal has been generated by a single microphone and the acoustic signal is subjected to an analysis of characteristics, the device comprising:

means for estimating a plurality of virtual microphone signals using the analysis, from the acoustic signal

wherein the plurality of virtual microphone signals are free of any reverberation, and the first virtual microphone signal corresponds to a direct sound without any time delay, and

wherein an n-th virtual microphone signal is obtained using a time delay dn that is a time period between an onset of an (n-1)-th reverberation sound of the acoustic signal and an onset of an n-th reverberation sound of the acoustic signal, the n being an integer equal to or greater than 2;

means for delaying each of the plurality of virtual microphone signals by a different respective period of time; and

means for adding the delayed each of the plurality of virtual microphone signals to produce a summarized output signal.

12. (currently amended): A computer ~~terminal comprising an input for a received acoustic signal, in particular a microphone and/or a data carrier device and/or a data line, an output for an enhanced quality acoustic signal, in particular a loudspeaker and/or a data carrier device and/or a data line, and means for performing~~ readable recording medium having recorded thereon a program for executing a method ~~according to~~ of claim 1.

13. (new): The method of claim 1, wherein in the delaying each of the plurality of virtual microphone signals, a last virtual microphone signal is not delayed, and

wherein the different respective period of time increases when applied to delay the plurality of virtual microphone signals from the first to the last virtual microphone signals.

14. (new): The method of claim 13, wherein the first virtual microphone signal is delayed by a time elapsed between an onset of the direct sound in the acoustic signal and an onset of a last reverberation sound in the acoustic signal, and the n-th virtual microphone signal is delayed by a time elapsed between an onset of the (n-1)-th reverberation signal and an n-th reverberation signal.

15. (new): The acoustic signal quality enhancement device of claim 11, wherein the means for delaying each of the plurality of virtual microphone signals is configured such that a last virtual microphone signal is not delayed, and the different respective period of time increases when applied to delay the plurality of virtual microphone signals from the first to the last virtual microphone signals.

16. (new): The acoustic signal quality enhancement device of claim 12, wherein the means for delaying each of the plurality of virtual microphone signals is further configured such

that the first virtual microphone signal is delayed by a time elapsed between an onset of the direct sound in the acoustic signal and an onset of a last reverberation sound in the acoustic signal, and the n-th virtual microphone signal is delayed by a time elapsed between an onset of the (n-1)-th reverberation signal and an n-th reverberation signal.

17. (new): The computer readable recording medium having recorded thereon a program for executing a method of claim 12, wherein in the delaying each of the plurality of virtual microphone signals, a last virtual microphone signal is not delayed, and

wherein the different respective period of time increases when applied to delay the plurality of virtual microphone signals from the first to the last virtual microphone signals.

18. (new): The computer readable recording medium having recorded thereon a program for executing a method of claim 17, wherein the first virtual microphone signal is delayed by a time elapsed between an onset of the direct sound in the acoustic signal and an onset of a last reverberation sound in the acoustic signal, and the n-th virtual microphone signal is delayed by a time elapsed between an onset of the (n-1)-th reverberation signal and an n-th reverberation signal.